



Image

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2000P09005US01
60,427-218

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Karel
Serial No.: 09/844,938
Filed: 04/27/2001
Group Art Unit: 2833
Examiner: Ta, Tho Dac
Title: ELECTRIC CONNECTION FOR FUEL INJECTORS

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner For Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

A second Notice of Appeal in this application was filed on December 12, 2003. Appellant now submits its brief in the above-referenced application. No fee is due as Appellant previously paid for filing a previous appeal brief for this application.

Real Party in Interest

Siemens VDO Automotive, Inc. is the real party in interest.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of the Claims

Claims 1-23 stand finally rejected under 35 U.S.C. §102(b), even though the Examiner appears to rely on more than one reference to anticipate the claims.

Status of Amendments

There are no unentered amendments. The claims appearing in the Appendix of Claims include the amendments made in response to the Office Action that reopened prosecution responsive to Appellant's previous appeal brief.

Summary of the Invention

Fuel injectors are used as part of the arrangement for providing fuel to an internal combustion engine in modern vehicles. Electrical connections with the appropriate portions of fuel injectors must establish the desired electrical contact in a manner that remains reliable throughout the expected service life of the vehicle fuel system. (Page 1, paragraph 3).

There are a variety of problems associated with conventional connection methods used for establishing electrical connections with fuel injector components. Typical connectors have an outer shell and a plurality of male pins that cooperate with a set of female connectors. Typical connector housings shield these pins from view once an attempted connection is made so that visual inspection is not possible. One difficulty associated with that situation is that the male or female connector parts may become bent or distorted before or during the attempted connection. Further, conventional connectors do not always provide a secure connection that lasts over the service life of the fuel system. (Page 1, paragraph 4).

The inventive fuel injector connection arrangement includes an electrical connection interface 24 that has at least one connector member 26 that facilitates making a reliable, visually observable electrical connection with a fuel injector. A support portion 30 of the connection interface 24 receives and supports a portion of a conductor 28 during an assembly process. The connector members 26 preferably are deformed so that at least one portion of each connector member pierces through an insulation layer 32 on the conductor 28 and forms an electrical coupling with a conductive portion 34 of the conductor 28. (Pages 2-3, paragraph 15-16).

In one example, the connector members 26 are barbs with pointed edges that pierce through the insulation layer 32 and engage the conductive portion 34. In one example arrangement, the connector members 26 are crimped into an electrically connected, conductive position. The electrical connection further makes a secure physical connection between the connection interface 24 and the conductor 28. (Page 3, paragraph 16).

Some example arrangements designed according to this invention include a covering 50 that covers over the connecting interface 24 and an associated portion of the conductor 28. One example covering 50 comprises molded plastic that is applied after the appropriate electrical connection has been made. Another example covering 50 is a seal that covers the connecting interface and provides a seal along the associated region of the fuel injector body 22 to prevent any contaminants from entering an opening in the body portion 22 adjacent the interface 24, where electrical connections to one or more components housed within the fuel injector body are made. The covering 50 prevents wear or deterioration over time due to environmental exposure. (Page 3, paragraph 17).

Independent claim 1 recites a fuel injector assembly having a body portion that houses fuel injector components and an electrical interface portion supported by the body. At least one

deformable connector means is supported on the interface portion and has at least one edge for piercing and penetrating an insulation covering on an electrical conductor to thereby electrically couple the interface portion to the electrical conductor.

Independent claim 4 recites the combination of the deformable connector member supported on the interface portion and the conductor. Claim 4 specifically recites in part, “the deformable connector member having at least one edge piercing through the insulation covering and making electrical contact with the electrical conductor.”

Independent claim 12 recites a method of making an electrically conductive connection that includes, “deforming the deformable connector member to pierce through an insulation covering on the conductor and to establish an electrically conductive connection between the electrical interface and the conductor.”

The various dependent claims add further structural and method limitations.

Issues

Whether the final rejection under 35 U.S.C. §102 is proper where there is no piercing of any insulation covering in the reference cited by the Examiner and every claim includes piercing through an insulation covering.

Grouping of Claims

The rejections of claims 1-23 are contested.

Claims 1-23 stand or fall together for purposes of this appeal.

Argument

INTRODUCTION

There is no anticipation because there is nothing in the cited reference that teaches piercing through an insulation layer, which is required by all of Appellant's claims.

THE CITED REFERENCES

A. United States Patent No. 5,584,704 ("the *Romann, et al.* reference")

The *Romann, et al.* reference discloses an arrangement where a printed circuit board 1 has a plurality of premanufactured holes 8 through which connector pins 9 of fuel injector valves 2 are received.

In column 4, the *Romann, et al.* reference teaches:

The printed-circuit board 1 has a plurality of connector-pin location holes 8 for contacting the fuel-injection valves 2. Projecting into these connector-pin location holes 8 of the printed-circuit board 1 are electrical connector pins 9 of the fuel-injection valves 2, which extend from a solenoid coil 10 (FIGS. 5 and 6) out of the fuel injection valve 2 and through which the solenoid coil 10 is excited. The connector-pin location holes 8 are already provided when the printed conductors 5 are produced on the printed-circuit board 1, so that contact difficulties are avoided later on. When there is one printed circuit board 1 for triggering four fuel-injection valves 2 with two electrical connector pins 9 each, the result is eight connector-pin location holes 8.

...

A permanent electrical connection can be established between the connector pins 9 of the fuel-injection valves 2 and the printed conductors 5 of the printed-circuit board 1, for example, by means of soldering, welding or crimping, i.e., a solderless squeezing.

(Column 4, lines 12-24 and 33-37).

The *Romann, et al.* reference never teaches piercing through an insulation layer on a conductor. The conductors 5 on the printed circuit board 1 have exposed ends at the openings 8,

which are provided in the printed circuit board before the conductors 5 are etched onto the board in a conventional manner.

The *Romann, et al.* reference teaches making a permanent electrical connection between the pins 9 and the conductors 5, which have at least one end exposed at an opening 8 using soldering, welding or “solderless squeezing.” It is important to note that the *Romann, et al.* reference teaches that its use of the word “crimping” is intended to mean solderless squeezing. There is nothing within the *Romann, et al.* reference that teaches using crimping in a manner that would result in piercing through an insulation layer even if insulation were provided on any of the conductors. This makes sense since the conductors in the *Romann, et al.* arrangement are already exposed at the openings 8 for making an electrical connection with a pin 9 that is received through the pre-made holes 8.

B. United States Patent No. 4,832,620 (“the *Yamamoto* reference”)

The Examiner relies upon the *Yamamoto* reference as teaching a definition of crimping that would include piercing through an insulation layer. Why a second reference is required in an attempt to establish a rejection under 35 U.S.C. §102(b) remains unexplained by the Examiner. Moreover, the *Yamamoto* reference only teaches that “crimping” means “bending,” which is the ordinary meaning of the term.

Assuming that the Examiner intends to rely upon the *Yamamoto* reference combined with the *Romann, et al.* reference to establish an obviousness rejection, the *Yamamoto* reference is discussed in this brief. Applicant respectfully submits that the reference need not even be considered for purposes of this appeal since the only rejection against the claims is under 35 U.S.C. §102(b), which by definition requires a single reference.

The *Yamamoto* reference discloses a plurality of connectors for making a connection with a flexible printed circuit board. The prior art versions in Figures 4A-5 are described as having projections that are “bent onto the conductor 5A of the flexible circuit board and fixed directly to the conductor by crimping for electrical connection, as shown in Figure 4C.” (Column 1, lines 23-25). In the example of Figure 4D, the projections 42 “penetrate the board and conductor 5A directly from below. The projections 42 are then bent and crimped directly to the conductor 5A by crimping as shown in FIG. 4D.” (Column 1, lines 33-35).

It is important to note that nowhere in the *Yamamoto* reference does it teach that crimping requires piercing through an insulation layer. Instead, it appears that the *Yamamoto* reference teaches that “crimping” only involves bending a connector so that it makes contact with an exposed conductor. Therefore, the Examiner’s interpretation of the term “crimping” from the *Yamamoto* reference as somehow requiring piercing through an insulation layer is unsupported.

THE REJECTION UNDER 35 U.S.C. §102(b)

The Examiner has rejected claims 1-23 stating that they are anticipated by the *Romann, et al.* reference. As noted above, the *Romann, et al.* reference nowhere teaches piercing through an insulation layer. Instead, premade holes 8 receive connector pins 9 that are then secured in place by welding, soldering or by squeezing the pins 9. There is nothing within the *Romann, et al.* reference that can fairly be interpreted as providing for, teaching or even suggesting piercing through an insulation layer. The conductors 5 on the printed circuit board 1 have exposed ends at the openings 8 to establish electrical connection. The *Romann, et al.* reference cannot be interpreted to teach piecing through an insulation layer, because there is none and the conductors 5 are already exposed at the location where contact is made with the pins 9.

THE REJECTION UNDER 35 U.S.C. §102(b) IS IMPROPER

Without every claim limitation, there is no anticipation. Every claim requires piercing through an insulation layer. Nothing in the *Romann, et al.* reference teaches or suggests that.

It is important to note the distinction between receiving a pin 9 through a preset hole 8 and piercing through an insulation layer. Piercing through an insulation layer requires causing a break or cut in the insulation layer that did not preexist. Accordingly, the pins 9 in the *Romann, et al.* reference do not pierce through the printed circuit board 1. Instead, they are merely received through premade holes. The plain and ordinary meaning of the term piercing distinguishes it from an arrangement where pins are received through premade holes or “crimping,” which really only involves bending or squeezing.

Therefore, there is no anticipation.

**THE EXAMINER’S RELIANCE ON THE YAMAMOTO REFERENCE
IS MISPLACED**

Again, assuming the Examiner is attempting to establish some sort of §103 rejection, the *Yamamoto* reference does not teach what the Examiner contends. The “crimping” in the *Yamamoto* reference merely involves bending connector members so that they touch an exposed conductor. There is nothing within the *Yamamoto* reference or the *Romann, et al.* reference that teaches that “crimping” requires piercing through an insulation layer. Appellant specifically challenges the Examiner’s statement in the advisory action that, “it is well known in the art that the flexible PCB has insulation covering over wire.” The *Yamamoto* reference never says that and shows an exposed conductor.

To the extent that the Examiner is using the language regarding crimping from the *Yamamoto* reference to interpret the word “crimping” in the *Romann, et al.* reference, it does not result in the claimed invention.

To the extent that the Examiner is attempting to establish an obviousness rejection, there is no *prima facie* case of obviousness because there is no benefit to making any proposed combination between the *Romann, et al.* reference and the *Yamamoto* reference. The connection technique described in the *Romann, et al.* reference would not benefit from the addition of any of the teachings from the *Yamamoto* reference. A significantly different approach is taken in both references and there is no motivation to combine them.

CLAIMS 1-23 ARE ALLOWABLE

Every claim requires piercing through an insulation layer. The *Romann, et al.* reference is void of any teaching of piercing through an insulation layer. Even the Examiner’s attempt to construe the term “crimping” in light of the *Yamamoto* reference does not provide piercing through an insulation layer. There is no anticipation and all the claims are allowable.

CONCLUSION

There is no anticipation at least because there is no piercing through an insulation covering in the *Romann, et al.* reference. Every claim includes piercing and, therefore, not one claim is anticipated. The rejections must be reversed. All claims are allowable.

Respectfully solicited,

CARLSON, GASKEY & OLDS, P.C.

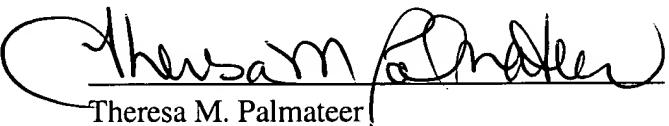
February 13, 2004

Date


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(248) 988-8360

CERTIFICATE OF MAIL

I hereby certify that the enclosed **Appeal Brief (in triplicate)** and **Fees** is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Mail Stop Appeal Brief - Patents; Commissioner For Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on February 13, 2004.


Theresa M. Palmateer

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APPENDIX OF CLAIMS

1. A fuel injector assembly, comprising:
 - a body portion that houses fuel injector components;
 - an electrical interface portion supported by the body portion; and
 - at least one deformable connector means supported on the interface portion, the deformable connector means having at least one edge for piercing and penetrating through an insulation covering on an electrical conductor to thereby electrically couple the interface portion to the electrical conductor.
2. The assembly of claim 1, wherein the connector means includes a plurality of connector members, each comprising a barb of flexible metal material.
3. The assembly of claim 1, wherein the electrical interface portion at least partially extends outwardly and away from the body portion and the deformable connector member is outside of the body portion.
4. A fuel injector assembly, comprising:
 - a body portion that houses fuel injector components;
 - an electrical interface portion supported by the body portion;
 - at least one deformable connector member supported on the interface portion; and
 - at least one electrical conductor having an insulation covering on a conductive portion, the deformable connector member having at least one edge piercing through the insulation covering and making electrical contact with the electrical conductor.

5. The assembly of claim 4, including a plurality of connector members, each comprising a barb of flexible metal material.
6. The assembly of claim 4, including a securing member placed over the conductor and the connector member.
7. The assembly of claim 6, wherein the securing member comprises plastic that is molded over the conductor and the connector member.
8. The assembly of claim 6, wherein the securing member comprises a seal.
9. The assembly of claim 6, wherein the securing member comprises at least one material selected from the group consisting of plastic, foam or silicone.
10. The assembly of claim 4, wherein the conductor comprises a flexible conductor cable.
11. The assembly of claim 4, including a plurality of conductors and a corresponding plurality of deformable connector members.

12. A method of making an electrically conductive connection between an electrical interface on a fuel injector that has at least one deformable connector member and an electrical conductor, comprising the steps of:

positioning a portion of the conductor near the deformable connector member; and

deforming the deformable connector member to pierce through an insulation covering on the conductor and to establish an electrically conductive connection between the electrical interface and the conductor.

13. The method of claim 12, including crimping the deformable member onto the conductor.

14. The method of claim 12, including at least partially penetrating the conductor with a portion of the deformable connector member to establish an electrically conductive coupling through the deformable connector member.

15. The method of claim 12, including covering the deformable connector member and an associated portion of the conductor after performing the deforming step.

16. The method of claim 15, including molding a plastic material onto the connector member and the associated portion of the conductor.

17. The method of claim 15, including placing a seal over the connector member and the associated portion of the conductor.

18. The assembly of claim 2, wherein the plurality of connector members make electrical contact with a single electrical conductor.
19. The assembly of claim 5, wherein the plurality of connector members make electrical contact with a single conductor.
20. The assembly of claim 4, wherein the conductor comprises a flex cable.
21. The assembly of claim 1, wherein the connector means establishes a mechanical connection between the interface portion and the conductor.
22. The assembly of claim 4, wherein the connector member establishes a physical connection between the interface portion and the conductor.
23. The method of claim 12, including physically securing the fuel injector interface to the conductor when deforming the deformable connector member.

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Applicant: Karell
Serial No.: 09/844,938
Filed: 04/27/2001
Group Art Unit: 2833
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There are a variety of problems associated with conventional connection methods used for establishing electrical connections with fuel injector components. Typical connectors have an outer shell and a plurality of male pins that cooperate with a set of female connectors. Typical connector housings shield these pins from view once an attempted connection is made so that visual inspection is not possible. One difficulty associated with that situation is that the male or female connector parts may become bent or distorted before or during the attempted connection. Further, conventional connectors do not always provide a secure connection that lasts over the service life of the fuel system. (Page 1, paragraph 4).

The inventive fuel injector connection arrangement includes an electrical connection interface 24 that has at least one connector member 26 that facilitates making a reliable, visually observable electrical connection with a fuel injector. A support portion 30 of the connection interface 24 receives and supports a portion of a conductor 28 during an assembly process. The connector members 26 preferably are deformed so that at least one portion of each connector member pierces through an insulation layer 32 on the conductor 28 and forms an electrical coupling with a conductive portion 34 of the conductor 28. (Pages 2-3, paragraph 15-16).

In one example, the connector members 26 are barbs with pointed edges that pierce through the insulation layer 32 and engage the conductive portion 34. In one example arrangement, the connector members 26 are crimped into an electrically connected, conductive position. The electrical connection further makes a secure physical connection between the connection interface 24 and the conductor 28. (Page 3, paragraph 16).

Some example arrangements designed according to this invention include a covering 50 that covers over the connecting interface 24 and an associated portion of the conductor 28. One example covering 50 comprises molded plastic that is applied after the appropriate electrical connection has been made. Another example covering 50 is a seal that covers the connecting interface and provides a seal along the associated region of the fuel injector body 22 to prevent any contaminants from entering an opening in the body portion 22 adjacent the interface 24, where electrical connections to one or more components housed within the fuel injector body are made. The covering 50 prevents wear or deterioration over time due to environmental exposure. (Page 3, paragraph 17).

Independent claim 1 recites a fuel injector assembly having a body portion that houses fuel injector components and an electrical interface portion supported by the body. At least one

deformable connector means is supported on the interface portion and has at least one edge for piercing and penetrating an insulation covering on an electrical conductor to thereby electrically couple the interface portion to the electrical conductor.

Independent claim 4 recites the combination of the deformable connector member supported on the interface portion and the conductor. Claim 4 specifically recites in part, “the deformable connector member having at least one edge piercing through the insulation covering and making electrical contact with the electrical conductor.”

Independent claim 12 recites a method of making an electrically conductive connection that includes, “deforming the deformable connector member to pierce through an insulation covering on the conductor and to establish an electrically conductive connection between the electrical interface and the conductor.”

The various dependent claims add further structural and method limitations.

Issues

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Grouping of Claims

The rejections of claims 1-23 are contested.

Claims 1-23 stand or fall together for purposes of this appeal.

Argument

INTRODUCTION

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THE CITED REFERENCES

A. **United States Patent No. 5,584,704 ("the *Romann, et al.* reference")**

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In column 4, the *Romann, et al.* reference teaches:

The printed-circuit board 1 has a plurality of connector-pin location holes 8 for contacting the fuel-injection valves 2. Projecting into these connector-pin location holes 8 of the printed-circuit board 1 are electrical connector pins 9 of the fuel-injection valves 2, which extend from a solenoid coil 10 (FIGS. 5 and 6) out of the fuel injection valve 2 and through which the solenoid coil 10 is excited. The connector-pin location holes 8 are already provided when the printed conductors 5 are produced on the printed-circuit board 1, so that contact difficulties are avoided later on. When there is one printed circuit board 1 for triggering four fuel-injection valves 2 with two electrical connector pins 9 each, the result is eight connector-pin location holes 8.

...

A permanent electrical connection can be established between the connector pins 9 of the fuel-injection valves 2 and the printed conductors 5 of the printed-circuit board 1, for example, by means of soldering, welding or crimping, i.e., a solderless squeezing.

(Column 4, lines 12-24 and 33-37).

The *Romann, et al.* reference never teaches piercing through an insulation layer on a conductor. The conductors 5 on the printed circuit board 1 have exposed ends at the openings 8,

which are provided in the printed circuit board before the conductors 5 are etched onto the board in a conventional manner.

The *Romann, et al.* reference teaches making a permanent electrical connection between the pins 9 and the conductors 5, which have at least one end exposed at an opening 8 using soldering, welding or “solderless squeezing.” It is important to note that the *Romann, et al.* reference teaches that its use of the word “crimping” is intended to mean solderless squeezing. There is nothing within the *Romann, et al.* reference that teaches using crimping in a manner that would result in piercing through an insulation layer even if insulation were provided on any of the conductors. This makes sense since the conductors in the *Romann, et al.* arrangement are already exposed at the openings 8 for making an electrical connection with a pin 9 that is received through the pre-made holes 8.

B. United States Patent No. 4,832,620 (“the Yamamoto reference”)

The Examiner relies upon the *Yamamoto* reference as teaching a definition of crimping that would include piercing through an insulation layer. Why a second reference is required in an attempt to establish a rejection under 35 U.S.C. §102(b) remains unexplained by the Examiner. Moreover, the *Yamamoto* reference only teaches that “crimping” means “bending,” which is the ordinary meaning of the term.

Assuming that the Examiner intends to rely upon the *Yamamoto* reference combined with the *Romann, et al.* reference to establish an obviousness rejection, the *Yamamoto* reference is discussed in this brief. Applicant respectfully submits that the reference need not even be considered for purposes of this appeal since the only rejection against the claims is under 35 U.S.C. §102(b), which by definition requires a single reference.

The *Yamamoto* reference discloses a plurality of connectors for making a connection with a flexible printed circuit board. The prior art versions in Figures 4A-5 are described as having projections that are “bent onto the conductor 5A of the flexible circuit board and fixed directly to the conductor by crimping for electrical connection, as shown in Figure 4C.” (Column 1, lines 23-25). In the example of Figure 4D, the projections 42 “penetrate the board and conductor 5A directly from below. The projections 42 are then bent and crimped directly to the conductor 5A by crimping as shown in FIG. 4D.” (Column 1, lines 33-35).

It is important to note that nowhere in the *Yamamoto* reference does it teach that crimping requires piercing through an insulation layer. Instead, it appears that the *Yamamoto* reference teaches that “crimping” only involves bending a connector so that it makes contact with an exposed conductor. Therefore, the Examiner’s interpretation of the term “crimping” from the *Yamamoto* reference as somehow requiring piercing through an insulation layer is unsupported.

THE REJECTION UNDER 35 U.S.C. §102(b)

The Examiner has rejected claims 1-23 stating that they are anticipated by the *Romann, et al.* reference. As noted above, the *Romann, et al.* reference nowhere teaches piercing through an insulation layer. Instead, premade holes 8 receive connector pins 9 that are then secured in place by welding, soldering or by squeezing the pins 9. There is nothing within the *Romann, et al.* reference that can fairly be interpreted as providing for, teaching or even suggesting piercing through an insulation layer. The conductors 5 on the printed circuit board 1 have exposed ends at the openings 8 to establish electrical connection. The *Romann, et al.* reference cannot be interpreted to teach piecing through an insulation layer, because there is none and the conductors 5 are already exposed at the location where contact is made with the pins 9.

THE REJECTION UNDER 35 U.S.C. §102(b) IS IMPROPER

Without every claim limitation, there is no anticipation. Every claim requires piercing through an insulation layer. Nothing in the *Romann, et al.* reference teaches or suggests that.

It is important to note the distinction between receiving a pin 9 through a preset hole 8 and piercing through an insulation layer. Piercing through an insulation layer requires causing a break or cut in the insulation layer that did not preexist. Accordingly, the pins 9 in the *Romann, et al.* reference do not pierce through the printed circuit board 1. Instead, they are merely received through premade holes. The plain and ordinary meaning of the term piercing distinguishes it from an arrangement where pins are received through premade holes or “crimping,” which really only involves bending or squeezing.

Therefore, there is no anticipation.

**THE EXAMINER’S RELIANCE ON THE YAMAMOTO REFERENCE
IS MISPLACED**

Again, assuming the Examiner is attempting to establish some sort of §103 rejection, the *Yamamoto* reference does not teach what the Examiner contends. The “crimping” in the *Yamamoto* reference merely involves bending connector members so that they touch an exposed conductor. There is nothing within the *Yamamoto* reference or the *Romann, et al.* reference that teaches that “crimping” requires piercing through an insulation layer. Appellant specifically challenges the Examiner’s statement in the advisory action that, “it is well known in the art that the flexible PCB has insulation covering over wire.” The *Yamamoto* reference never says that and shows an exposed conductor.

To the extent that the Examiner is using the language regarding crimping from the *Yamamoto* reference to interpret the word “crimping” in the *Romann, et al.* reference, it does not result in the claimed invention.

To the extent that the Examiner is attempting to establish an obviousness rejection, there is no *prima facie* case of obviousness because there is no benefit to making any proposed combination between the *Romann, et al.* reference and the *Yamamoto* reference. The connection technique described in the *Romann, et al.* reference would not benefit from the addition of any of the teachings from the *Yamamoto* reference. A significantly different approach is taken in both references and there is no motivation to combine them.

CLAIMS 1-23 ARE ALLOWABLE

Every claim requires piercing through an insulation layer. The *Romann, et al.* reference is void of any teaching of piercing through an insulation layer. Even the Examiner’s attempt to construe the term “crimping” in light of the *Yamamoto* reference does not provide piercing through an insulation layer. There is no anticipation and all the claims are allowable.

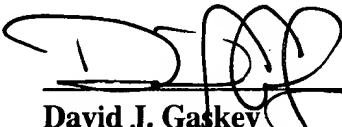
CONCLUSION

There is no anticipation at least because there is no piercing through an insulation covering in the *Romann, et al.* reference. Every claim includes piercing and, therefore, not one claim is anticipated. The rejections must be reversed. All claims are allowable.

Respectfully solicited,

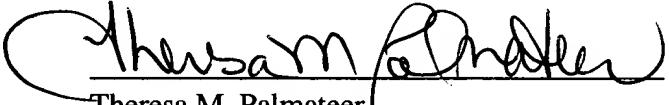
CARLSON, GASKEY & OLDS, P.C.

February 13, 2004
Date


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CERTIFICATE OF MAIL

I hereby certify that the enclosed **Appeal Brief (in triplicate)** and Fees is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Mail Stop Appeal Brief - Patents; Commissioner For Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on February 13, 2004.


Theresa M. Palmateer

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APPENDIX OF CLAIMS

1. A fuel injector assembly, comprising:
 - a body portion that houses fuel injector components;
 - an electrical interface portion supported by the body portion; and
 - at least one deformable connector means supported on the interface portion, the deformable connector means having at least one edge for piercing and penetrating through an insulation covering on an electrical conductor to thereby electrically couple the interface portion to the electrical conductor.
2. The assembly of claim 1, wherein the connector means includes a plurality of connector members, each comprising a barb of flexible metal material.
3. The assembly of claim 1, wherein the electrical interface portion at least partially extends outwardly and away from the body portion and the deformable connector member is outside of the body portion.
4. A fuel injector assembly, comprising:
 - a body portion that houses fuel injector components;
 - an electrical interface portion supported by the body portion;
 - at least one deformable connector member supported on the interface portion; and
 - at least one electrical conductor having an insulation covering on a conductive portion, the deformable connector member having at least one edge piercing through the insulation covering and making electrical contact with the electrical conductor.

5. The assembly of claim 4, including a plurality of connector members, each comprising a barb of flexible metal material.
6. The assembly of claim 4, including a securing member placed over the conductor and the connector member.
7. The assembly of claim 6, wherein the securing member comprises plastic that is molded over the conductor and the connector member.
8. The assembly of claim 6, wherein the securing member comprises a seal.
9. The assembly of claim 6, wherein the securing member comprises at least one material selected from the group consisting of plastic, foam or silicone.
10. The assembly of claim 4, wherein the conductor comprises a flexible conductor cable.
11. The assembly of claim 4, including a plurality of conductors and a corresponding plurality of deformable connector members.

12. A method of making an electrically conductive connection between an electrical interface on a fuel injector that has at least one deformable connector member and an electrical conductor, comprising the steps of:

positioning a portion of the conductor near the deformable connector member; and
deforming the deformable connector member to pierce through an insulation covering on the conductor and to establish an electrically conductive connection between the electrical interface and the conductor.

13. The method of claim 12, including crimping the deformable member onto the conductor.

14. The method of claim 12, including at least partially penetrating the conductor with a portion of the deformable connector member to establish an electrically conductive coupling through the deformable connector member.

15. The method of claim 12, including covering the deformable connector member and an associated portion of the conductor after performing the deforming step.

16. The method of claim 15, including molding a plastic material onto the connector member and the associated portion of the conductor.

17. The method of claim 15, including placing a seal over the connector member and the associated portion of the conductor.

18. The assembly of claim 2, wherein the plurality of connector members make electrical contact with a single electrical conductor.
19. The assembly of claim 5, wherein the plurality of connector members make electrical contact with a single conductor.
20. The assembly of claim 4, wherein the conductor comprises a flex cable.
21. The assembly of claim 1, wherein the connector means establishes a mechanical connection between the interface portion and the conductor.
22. The assembly of claim 4, wherein the connector member establishes a physical connection between the interface portion and the conductor.
23. The method of claim 12, including physically securing the fuel injector interface to the conductor when deforming the deformable connector member.

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